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Unlocking the Treasures of the Ocean: Current Assessment and Future Perspectives of Seafloor Resources (C.F Gauss Lecture)

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Oceans cover 70% of the Earth's surface, and there is reason to believe that the wealth of mineral and carbon resources on the seafloor is similar to deposits on land. While off-shore energy resources such as oil and gas are nowadays regarded as conventional, energy resources in form of methane hydrates and seafloor mineral deposits are yet unconventional and at best marginally economic. However, taking into account global population growth, geopolitics and technological development (both in terms of increasing industrialization and possibility to explore and mine seafloor resources), these resources might play a more fundamental role in the future. Resource assessment and understanding of the geological formation process of resources are topics in marine geosciences with broad relevance to society.

The lecture presents an overview of the geophysical exploration of the seafloor and its resource potential. Starting from the link of physical parameter anomalies associated with resources, I will explore marine technological developments on how to sense them remotely from the seafloor. Also the question will be addressed of how well we can actually quantify the amount of resources from geophysical data. The process will be illustrated based on theoretical work as well as case studies from around the world.